Sai Krishna Deepak Maram

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Research Interests

Computer Security, Applied Cryptography

Education

2018 - present **Ph.D. in Computer Science**.
Cornell University, USA
Advisor: *Ari Juels*

2012 - 16 **B.Tech in Computer Science with Honors**.
Indian Institute of Technology, Bombay, India
GPA: 8.91/10

Publications / Research Experience

2019 **DECO: Liberating Web Data Using Decentralized Oracles**, `www.deco.works`.
F. Zhang, **S.K.D. Maram**, H. Malvai, S. Goldfeder, and A. Juels. (In submission.)
Designed a novel privacy-preserving oracle protocol that makes public and private data accessible to a rich spectrum of applications including smart contracts. DECO works with modern TLS versions and relies on optimized MPC and zero-knowledge techniques. Implemented the zero-knowledge techniques to prove arbitrary statements about underlying TLS-protected data.

2019 **CHURP: Dynamic-committee Proactive Secret Sharing**, `www.churp.io`.
S.K.D. Maram, F. Zhang, L. Wang, A. Low, Y. Zhang, A. Juels, and D. Song.
Proceedings of the 2019 ACM Conference on Computer and Communications Security.
Devised a novel cryptographic protocol to facilitate dynamic committees in secret sharing, thus enabling decentralized key storage. Improved the state-of-the-art protocol to incur atleast 1000x less communication cost for large committees.

2019 **SkinnerDB: Regret-Bounded Query Evaluation via Reinforcement Learning**.
I. Trummer, S. Moseley, **S.K.D Maram**, S. Jo, and A. Antonakakis.
Proceedings of the 2019 International Conference on Management of Data (SIGMOD).
Expanded the query processing engine of SkinnerDB to support a wide range of queries and implemented several query optimization strategies. Demonstrated orders of magnitude improvement over a traditional DBMS for several difficult-to-optimize queries.

2016 **Incentive Stackelberg Mean-payoff Games**.
A. Gupta, S. Schewe, A. Trivedi, **S.K.D. Maram**, P. Bharath Kumar
Proceedings of the 2016 Conference on Software Engineering and Formal Methods (SEFM).
Implemented a tool to demonstrate that incentive equilibria strategies perform better than other equilibria for playing multi-player mean-payoff games (MMPG).

2015 **SCION: Next generation Internet Architecture**, *ETH Zurich*.
Research Internship, *Guide: Prof.Adrian Perrig*
Devised a new category of attack in SCION that exploits the network architecture to gain extended access to favorable routing paths. Also proposed defenses that render such an attack impractical.

Honors / Awards

2018 Awarded University Fellowship by Cornell University

2012 Secured All India Rank 12 in *IIT-JEE* out of 500,000 students

2012 Recipient of KVPY scholarship and attended VIJYOSHI Camp

2011 Awarded merit certificate for being in top 1% in National Standard Examination - Astronomy

Other Projects

Spring 2015 **Experiments with wireless bit-rate adaptation**, *IIT Bombay*.
R&D Project, *Guide: Prof.Mythili Vutkuru*
Performed experiments related to lookaround rate of the wireless bit-rate adaptation algorithm, Minstrel. Formulated bit-rate adaptation as an instance of the Multi-armed bandit problem.

Spring 2015 **Operating System Simulator**, *IIT Bombay*.
Guide: Prof. Dhananjay M. Dhamdhere
Implemented data structures and algorithms for managing page tables, Memory Management Unit, directories, and file space allocations.

Spring 2014 **Simulation of a 4-Stroke Radial Engine using Box2D**, *IIT Bombay*.
Class Project, *Guide: Prof. Parag Chaudhuri*
Simulated a 4-stroke radial engine in C++ using Box2D, a Physics Simulation Engine.

Industry Experience

2016 - 17 **Software Developer**, *Oracle*, Bangalore.
Worked in Server Technology group on the implementation of JSR 366 for the GlassFish web application server. Developed several core features in the deployment module which released in Java EE RI 8.

Summer 2014 **Software Developer Internship**, *Housing.com*, Mumbai.
Modeled and implemented an algorithm that optimizes the bids placed on ads displayed in Google Search Engine using Google AdWords API based on factors such as the number of clicks, cost and impressions.

Posters / Talks

Feb 2019 **CHURP: Dynamic-committee Proactive Secret Sharing**.
Gave a talk at the Initiative for Cryptocurrencies and Contracts (IC3) Winter Retreat, Interlaken.

Aug 2018 **SkinnerDB: Regret-Bounded Query Evaluation via Reinforcement Learning**.
Presented poster at VLDB 2018, Rio.

Aug 2015 **An attack on SCION and SCION Discrete Event Simulator**.
Gave a talk at the end of my internship at ETH Zurich.

Teaching Experience

Fall 2015 **Undergraduate Tutor**, *Department of Computer Science, IIT Bombay*.
Data Structures and Algorithms
Served as a tutor and held weekly sessions to help students with Data Structures and Algorithms.

Spring 2016 **Teaching Assistant**, *IIT Bombay*.
CS101: Computer Programming
Worked as a TA for CS 101—conducted lab sessions and designing questions for weekly labs and examinations.

Course Work

Graduate Advanced Programming Languages, Advanced Systems, Intro to Computer Vision, Security & Privacy Technologies, Cryptocurrency and Smart Contracts.

Undergraduate Data Structures, Algorithm Design, Computer Networks, Discrete Structures, Computer Architecture, Database Systems, Operating Systems, Artificial Intelligence, Advances in Intelligent and Learning Agents, Advanced Network Security and Cryptography, Computational Ring Theory, Graph Theory.

Technical Skills

Languages C, C++, Python, Java, Rust, HTML, CSS, LaTeX, JS, SQL, PHP

Technologies Intel SGX, zkSNARK, TLS, ns3 (Network Simulator), PostgreSQL

Service / Extra-curriculars

2019 Serving as the treasurer of PhD student organization At Cornell Tech (PACT)

2014 Awared first prize at the *XLR8* competition for designing a Wireless Controlled Bot

2003 - 07 Won first prize in several district-level chess competitions and participated in state-level competitions